SIR ROGER DE COVERLEY.—No. VIII.

Addison, after a long interval in the production of his papers on the worthy knight whom he had adopted for his own, brings him to London. His character will now be brought out under new aspects. The following passages are from the 'Spectator,' No. 269.

"I was this morning surprised with a great knocking at the door, when my landlady's daughter came up to me, and told me that there was a man below desired to speak with me. Upon my asking her who it was, she told me it was a very grave elderly person, but that she did not know his name. I immediately went down to him, and found him to be the coachman of my worthy friend Sir Roger de Coverley. He told me that his master came to town last night, and would be glad to take a turn with me in Gray's Inn walks. As I was wondering with myself what had brought Sir Roger to town, not having lately received any letter from him, he told me that his master was come up to get a sight of Prince Eugene, and that he desired I would immediately meet him.

"I was not a little pleased with the curiosity of the old knight, though I did not much wonder at it, having heard him say more than once in private discourse, that he looked upon Prince Eugenio (for so the knight always calls him) to be a greater man than Scanderbeg.

"I was no sooner come into Gray's Inn walks, but I heard my friend hemming twice or thrice to himself with great vigour, for he loves to clear his pipes in good air (to make use of his own phrase), and is not a little pleased with any one who takes notice of the strength which he still exerts in his morning hems.

"I was touched with a secret joy at the sight of the good old man, who, before he saw me, was engaged in conversation with a beggar-man that had asked an alms of him. I could hear my friend chide him for not finding out some work; but at the same time saw him put his hand in his pocket and give him sixpence.

"Our salutations were very hearty on both sides, consisting of many kind shakes of the hand, and several affectionate looks which we cast upon one another. After which the knight told me my good friend his chaplain was very well, and much at my service, and that the Sunday before he had made a most incomparable sermon out of Dr. Barrow. 'I have left,' says he, 'all my affairs in his hands, and being willing to lay an obligation upon him, have deposited with him thirty marks, to be distributed among his poor parishioners.'

"He then proceeded to acquaint me with the welfare of Will Wimble. Upon which he put his hand into his fob, and presented me, in his name, with a tobacco-stopper, telling me that Will had been busy all the beginning of the winter in turning great quantities of them; and that he made a present of one to every gentleman in the country who has good principles, and smokes. He added, that poor Will was at present under great tribulation, for that Tom Touchy had taken the law of him for cutting some hazel-sticks out of one of his hedges.

"Among other pieces of news which the knight brought from his country-seat, he informed me that Moll White was dead, and that about a month after her death the wind was so very high that it blew down the end of one of his barns. 'But for my own part,' says Sir Roger, 'I do not think that the old woman had any hand in it.'

"He afterwards fell into an account of the diversions which had passed in his house during the holidays: for Sir Roger, after the laudable custom of his ancestors, always keeps open house at Christmas.

"I learned from him that he had killed eight fat hogs for this season; that he had dealt about his chines very liberally amongst his neighbours, and that in particular he had sent a string of hogs'-puddings, with a pack of cards, to every poor family in the parish. 'I have often thought,' says Sir Roger, 'it happens very well that Christmas should fall out in the middle of winter. It is the most dead uncomfortable time of the year, when the poor people would suffer very much from their poverty and cold, if they had not good cheer, warm fires, and Christmas gambols to support them. I love to rejoice their poor hearts at this season, and to see the whole village merry in my great hall. I allow a double quantity of malt to my small-beer, and set it a running for twelve days to every one that calls for it. I have always a piece of cold beef and a mince-pie upon the table, and am wonderfully pleased to see my tenants pass away a whole evening in playing their innocent tricks, and smutting one another. Our friend Will Wimble is as merry as any of them, and shows a thousand roguish tricks upon these occasions.' . . . .

"Having passed away the greatest part of the morning in hearing the knight's reflections, which were partly private and partly political, he asked me if I would smoke a pipe with him over a dish of coffee at Squires's. As I love the old man, I take delight in complying with everything that is agreeable to him, and accordingly waited on him to the coffee-house, where his venerable figure drew upon us the eyes of the whole room. He had no sooner seated himself at the upper end of the high table, but he called for a clean pipe, a paper of tobacco, a dish of coffee, a wax-candle, and the 'Supplement,' with such an air of cheerfulness and good humour, that all the boys in the coffee-room (who seemed to take pleasure in serving him) were at once employed on his several errands, insomuch that nobody else could come at a dish of tea until the knight had got all his conveniences about him."

THE USES OF STRAW.

It perhaps seldom occurs to the minds of those even who are in the habit of using straw every day, or it may be almost every hour in the day, how exceedingly diverse and even apparently incompatible are the uses to which that commodity is applied. As a food for cattle and horses, as a litter or absorbent for the refuse of stalls and stables, as a covering for the roofs of houses, as a material for hats and bonnets, as a substitute for feathers in beds and mattresses—straw is presented to our notice in a variety of forms, which merit a little attention.

Sir John Sinclair, in one of his agricultural works published some years ago, collected the opinions of many practical persons as to the relative values of straw when used as *fodder* and when used as *litter;* and it is not a little curious to see the diversity in these opinions. One writer observed, that "If a Yorkshire farmer and a Norfolk farmer got equal quantities of straw, the Yorkshireman would make his cattle eat almost every particle, and would scarcely leave any to litter the stalls with; whilst the Norfolk-man would convert the whole into manure." Such differences were observable, in a smaller degree, between the individual opinions of various persons, and seem to rest partly on the kind of husbandry most prevalent in the district. Sir John gives a few remarks on straw in reference to the weight produced from average crops of grain—the relative values of different kinds—and the uses to which straw is applied, as fodder, litter, thatch, and a material for manufactures.

The weight of straw produced from one acre of grain seems to depend on different circumstances—the species of grain; the variety of the species employed; the dryness or moisture of the season; the quality of the soil; the season when the seed is sown; and the manner in which the straw is cut. From estimates collected in different quarters, relative to the straw of wheat, beans, peas, oats, and barley, and under various circumstances, Sir John came to an opinion "that on an average of years, well-cultivated and fertile soils, when the crop is carefully cut down, will annually produce, on the average of the crops above mentioned, and taking the average of the kingdom, one ton five hundredweight of straw per English acre."

The price of straw depends a good deal on the vicinity of towns; and it has sometimes happened that the price, under such circumstances, is so high, that innkeepers have chosen to litter their horses with hay, as a matter of economy. In some parts of the country oat-straw sells at a higher price than that of wheat; while in others wheat-straw commands the higher price, according to the circumstances under which the district is placed.

In former times the feeding of cattle was the great object to which straw was applied, almost every blade being devoted to that purpose, and scarcely any left to litter the stalls. This was succeeded by an opposite extreme; the straw being used almost entirely for litter, and scarcely at all as fodder. But a medium

course is now more prevalent, modified and regulated by the kind of straw produced. Thus wheat-straw, from its strength, is well calculated both for litter and for thatching; and when cut into chaff, it is also used much as fodder. In Scotland it is often steamed with potatoes, and in that form given to cattle and horses. When used uncut, or in the whole state, oat-straw is deemed better than wheat-straw as fodder; and during the winter season oat-straw is very generally used in many counties of Scotland instead of hay. Barley-straw is in many districts condemned as bad fodder for cattle; but the ancients are stated by Pliny to have preferred barley-straw to wheat-straw for this purpose; a circumstance which Sir John Sinclair accounts for by supposing the barley to have been better harvested in the fine climate of Italy: and indeed in some English districts barley-straw, when well harvested, is preferred to some others. Bean-straw, used either with oats or with peas-straw, is eaten in many counties by cattle and working horses in the winter season.

In respect to the use of straw as litter, it may be considered as having two objects in view—the formation of a bed in which the animal may lie down, and an absorbent for animal refuse, afterwards to be used as manure. This littering is effected in four different ways—in stalls or stables, in hammels, in fold-yards, and in open folds. The "hammels" are sheds with small folds holding only two or three cattle each. Each of these four modes of littering has its advocates and its opponents, in respect to the expense at which the plan can be worked out, the health of the animals exposed to it, the kind and quantity of straw used in the litter, and the quantity and value of the manure resulting from it; but these are details of practical husbandry into which it is not the purpose here to enter.

In respect to the employment of straw as thatch for cottages, it may be remarked that the kinds used for this purpose are not such as are commonly consumed as fodder, and therefore the value of the straw employed is, to the grower, either the price he could obtain for it in the market, or the value of the litter that could be made from it. All the circumstances connected with thatching have, however, been pretty fully discussed in two articles in a former volume of the 'Penny Magazine' (1840, pp. 93 and 100); and to those we may refer for details.

Straw is employed in a few minor agricultural operations. In Essex and some other counties it is used for the purpose of under-draining; the straw being twisted into a kind of rope, and put into the hollows. In draining with stones, straw is sometimes laid above the stones, before the earth is thrown in, to prevent it from getting down. Straw is used for covering hay and corn stacks; and where it is the practice to cut the wheat-crops at a great height, the stubble is mown afterwards, close to the ground, and collected for that purpose. In some parts of Scotland straw mixed with clay is used for building the walls of houses and gardens, and for roofing houses in lieu of thatch.

As regards manufactures, common straw, as well as bean-halm, used formerly to be burned at a potash manufactory near Gloucester for the sake of the ash; but we believe this plan is not much acted on at present. Straw is much used by saddlers in the collars for horses; and in some country districts the entire collar is made of straw. Straw is used as a stuffing for mattresses, paillasses, and other articles of furniture; and the chaff of oats is so well fitted for this purpose, that chaff-beds are very prevalent among the humbler class of inhabitants in Scotland. Chaff-paper has more than once been attempted to be manufactured; and the Neckinger Mills at Bermondsey were erected for this purpose sixty or seventy years ago; but the attempt does not seem to have been successful.

But the most important use of straw in the manufacturing arts is as a material for hats and bonnets. Extensive as is this manufacture, it is not supposed to have been carried on as a separate branch of trade until within seventy or eighty years; for the wives and daughters of the farmers used to plait straw for making their own bonnets. A notice of the straw-plait manufacture divides itself into two varieties—British and foreign; and for a few details respecting these we shall be indebted to M'Culloch.

The district of England in which straw-plait is made comprises the counties of Bedford, Hertford, Buckingham, and parts of Essex and Suffolk, being the counties most favourable for the production of wheat-straw. During the late war, the importation of straw-hats from Leghorn having in a great measure ceased, an extraordinary degree of encouragement was given to the domestic manufacture in England, and a proportional degree of comfort was derived by the agricultural labourers in these places, by whose wives and children it was principally followed. This activity led to competition; and the competition led to improvements in the growth and selection of the straw, and in the splitting, finishing, and bleaching. But when the conclusion of the war led to the importation of Leghorn hats, their fineness, colour, and durability speedily gave them a preference over the home manufacture, which thenceforth declined. With the view of improving the condition of the straw-plaiters, the Society of Arts offered premiums for the successful application of some of our native grasses, or straw other than the wheat-straw in general use; and for improvements in plaiting, finishing, and bleaching. The result of these offers was, that although the English straws, from the brittleness of their stems and the inequality of their colour, were not able to compete with the Leghorn, yet, by imitating and introducing among the English plaiters the Italian mode of plaiting and the Italian straw, it has been found practicable to found an intermediate system by applying English labour to Italian straw. The duty on the import of Leghorn hats was 5*s*. 8*d*. or 11*s*. 4*d*. each, according to the size; and of the Italian plait, 17*s*. per pound: whereas the straw paid but a mere nominal duty of one penny per cwt.; and thus the English plaiters were able to produce, from Leghorn straw, hats at a greatly lower price than the real Leghorn hat could possibly be sold for in England.

Of this branch of industry it has been observed:—"There is, perhaps, no manufacture more deserving of encouragement and sympathy than that of straw-plait, as it is quite independent of machinery, and is a domestic and healthful employment, affording subsistence to great numbers of the families of agricultural labourers, who without this resource would be reduced to parish relief. By the estimate of an intelligent individual, intimately acquainted with the manufacture, it is considered that every score (or twenty yards) of plait consumes a pound of straw in the state in which it is bought of the farmer; that, at an average, every plaiter makes fifteen yards per day; that in the counties of Hertford, Bedford, and Bucks there are, at an average, ten thousand scores brought to market every day, to make which thirteen thousand persons, women and children, must be employed. In Essex and Suffolk it is estimated that two thousand scores are the daily produce, to make which about three thousand persons are employed: and about four thousand persons more must be employed to convert these quantities into bonnets. Including other places where the

manufacture is carried on in England, there are, perhaps, in all about thirty thousand persons engaged in it."

About twenty years ago a Scotch firm established straw-plaiting in the Orkney Isles, and adopted rye-straw as the material; and at first there seemed some prospect of success; but it does not appear that the competition of foreign-grown straw could be successfully met.

There are several descriptions of plait made in England—such as the 'whole Dunstable,' the 'split straw,' the 'patent Dunstable,' the 'Devonshire,' the 'Luton,' the 'Bedford Leghorn,' the 'Italian,' the 'backbone,' the 'lustre,' the 'wave,' the 'diamond,' &c.; differing from one another in the straws being whole or split, in the thickness of the straws, in the number of them plaited together, and in other points.

In Italy this manufacture is principally followed in the neighbourhood of Florence, Pisa, Sienna, and the Val d'Arno, in the duchy of Tuscany; and it is also established at Venice and other places. It is purely a domestic manufacture, as in England, and the produce is collected by dealers who go round the country. It has been estimated that about thirty thousand persons are engaged in the manufacture. The straw employed is cultivated solely for this purpose, and is a variety of bearded wheat somewhat similar to that grown in the Vale of Evesham. After undergoing a preparatory process, the upper parts of the stems (being first sorted as to colour and thickness) are formed into a plait of generally thirteen straws, which is afterwards knitted together at the edges into a circular shape called a 'flat' or 'hat.' The fineness of the flats is determined by the number of rows of plait which compose them (counting from the bottom of the crown to the edge of the brim); and their relative fineness ranges from about No. 20 to No. 60, being the number of rows contained in the breadth of the brim, which is generally eight inches. They are afterwards assorted into first second, and third qualities, which are determined by the colour and texture, the most faultless being denominated the first, and the most defective the third. These qualities are much influenced by the season of the year in which the straw is plaited; spring being the most favourable, both for plaiting and bleaching. The dust and perspiration in summer, and the benumbed fingers of the workwomen in winter, when they are compelled to keep within their smoky huts, plaiting the cold and wet straw, are equally injurious to the colour of the hats, which no bleaching can remedy. The flats are afterwards made up in cases of ten or twenty dozen, assorted in progressive numbers or qualities. The *Brozzi*-make bears the highest repute, and the *Signa* is considered secondary; which names are given to the flats from the districts where they are plaited. Florence is the principal market; and the demand is chiefly from England, France, Germany, and America.

Sagacity of Rats.—The sagacity and foresight of rats are very extraordinary, and the following anecdote, wonderful as it may appear, may be relied upon:—An open box, containing some bottles of Florence oil, was placed in a store-room which was seldom visited. On going into the room for one of the bottles, it was perceived that the pieces of bladder and the cotton which were at the mouth of each bottle had disappeared, and that a considerable quantity of the contents of the bottles had been consumed. This circumstance having excited surprise, some of the bottles were filled with oil, and the mouths of them secured as before. The next morning the coverings of the bottles had again been removed, and part of the oil was gone. On watching the room through a small window, some rats were seen to get into the box, insert their tails into the necks of the bottles, and then withdrawing them, lick off the oil which adhered to them. I would not give this anecdote were I not convinced of its accuracy. Whilst I am on the subject of the kind disposition which animals show to each other, I will mention an anecdote which was recently communicated to me of the old English or black rat. This animal has now become very scarce in this country. Unlike the Norway rat, which is fierce, and lives in little harmony even with its own species, our original animals appear to have been sociable in their habits, and to have shown kindness and friendship to each other. The fact referred to was communicated to me by the Rev. Mr. Ferryman, a clergyman in the county of Sussex, and an accurate observer of nature. He informed me that some fifty years ago, when the old English rat was numerous, he resided at Quorn in Leicestershire. Walking out in some meadows one evening, he observed a great number of rats in the act of migrating from one place to another, which it is known they are in the habit of doing occasionally. He stood perfectly still, and the whole assemblage passed close to him. His astonishment, however, was great when he saw amongst the number an old blind rat, which held a piece of stick by one end in its mouth, whilst another rat had hold of the other end of it, and thus conducted its blind companion. Mr. Ferryman also communicated to me the following anecdote of a rat, which I am in justice to him bound to admit he did not *implicitly* believe himself, neither are my readers required to do so; I merely give the story as I heard it. He said that he had an old friend, a clergyman, of retired and studious habits. This gentleman, when sitting in his room one day, saw an English rat come out of a hole at the bottom of the wainscot: he threw it a piece of bread, and in process of time he had so familiarised the animal that it became perfectly tame, ran about him, was his constant companion, and appeared much attached to him. He was in the habit of reading in bed at night, and was on one occasion awoke by feeling a sharp bite on his cheek: on looking round he discovered the curtains of his bed to be on fire. He made his escape, but his house was burnt down, and he saw no more of the rat. He was, however, convinced, and remained so for the rest of his life, that his old companion had saved him from being burnt to death by biting his cheek, and thus making him aware of his danger. The reader may put what faith he pleases on the supposition of the good clergyman. He himself was always indignant if any one doubted it; and certainly the marks of teeth were visible on his cheek. That rats are endowed with an extraordinary degree of ingenuity and cunning, there are numerous well-attested facts to prove: the following is one of them:—A ship on her voyage was not only much infested with rats, but proved so unfit for sea, that her stores were directed to be made over to another vessel. In doing this the greatest care was taken that the rats should not gain access to the other ship; and in order to prevent it, the two vessels were anchored at some distance from each other, and the stores were removed in boats. When the crew were about to quit the vessel, the whole body of rats were seen to make their way down its sides into the sea, and to swim to the ship into which the stores had been deposited: this they would have penetrated, had not the vigilance of the crew prevented them. The vessel got under weigh, and the rats were left to their fate.—*Jesse's Gleanings.*

Influence of the Fine Arts.—Wherever the arts are cultivated with success, they almost imperceptibly educate the general taste, and make politeness of mind keep pace with refinement of manners. They are to a highly commercial and opulent state of society what chivalry was to the feudal system; they wear down its asperities, correct its selfishness, relieve the sternness of its action, enliven the dullness of its repose, and mitigate the fierceness of its enjoyments. Where the arts are well understood, fashion cannot be so monstrous or fantastic as where they exert no salutary dominion over the fond love of variety. The source of excellence in art being a judicious observation of nature, and a right perception of her principles of beauty and symmetry, a closer adherence to nature will mark the fashions of society polished by their ascendency than can distinguish the habits of people without the sphere of their influence. Hence the barbaric nations, where there is much wealth, never expend it in such a way as proves they have any notion of the pleasures of refinement. They endeavour to attract admiration through the vulgar passion of adornment, which is in a moment excited, and as suddenly expires, rather than create a rational respect by consulting for the praise of enlightened opinion.—*Writings of the late Sidney Taylor.*

[Panama.—From an original Sketch.]

JUNCTION OF THE ATLANTIC AND PACIFIC OCEANS.

The extreme importance to all commercial countries of obtaining a ready access to the rich and productive countries of the East, has from the earliest dawn of European civilization led to efforts for its accomplishment. To the difficulties experienced in their Oriental trade by the Venetians and Genoese we owe the discovery of America by Columbus; but though a continent was found, the object sought was not attained. Since that time repeated and even yet continued endeavours have been made to discover a north-west passage, which for England would be the most advantageous, giving her a direct entrance by the North Pacific at once to her colonial possessions in North America, and her establishments in India, China, and Australasia. Of any such passage, practically useful for commercial purposes, there now seems but little probability. Failing in this point, modern enterprise has turned its attention to effecting by art what appears to have been denied by nature. The narrow strip of land, uniting what may be called the two continents, north and south, of America, extends from 77° W., the eastern end of the Gulf of Darien, to 83° W., St. Juan de Nicaragua, a length, measuring along the curve, of about five hundred miles, and lies between the parallels of 7° 20′ and 8° 45′ N. lat., with a breadth varying from thirty miles in Panama Proper, to about one hundred miles in the province of Veragua, which forms the western part of the neck. Any transit across this narrow strip, available for commercial purposes, would be of much benefit, and a navigable passage through it would enable European vessels to avoid the long and dangerous course round Cape Horn to all the countries bordering on the Pacific; and facilitate their route to China and the East Indies by availing themselves of the trade-winds, and escaping the doubling of the Cape of Good Hope; while to the United States which border on the Atlantic the advantage would be still greater. The passage sought for by Columbus would be in fact accomplished.

The first attempt of this nature dates as far back as 1695, when the Scottish parliament passed an act incorporating a company with extensive privileges, at the solicitation of one Paterson, to form a settlement on the Isthmus of Darien, into which scheme the Scottish nation entered with more than their usual enthusiasm. Paterson "considered that isthmus as a place where a good settlement might be made, or rather two settlements, for he proposed establishing a town and blockhouse on the side of the Atlantic, and another over against it in Panama Bay, on the shores of the Pacific, from which conjointly a trade might be opened both with the West Indies and the East." ('Pict. Hist. of England,' vol. iv., p. 54.) In 1698, 1200 men sailed from Leith Roads to form this settlement, and in October, says the work we have just quoted, "they landed at Acta, in a convenient harbour, one of the sides of which was formed by a long narrow neck of land. This neck of land they cut through, and, having thus formed a sort of island, they erected upon it their little fort, which they christened New St. Andrew's, or, according to other accounts, New Edinburgh. Some forty or fifty guns were landed from the ships and planted round the fort. On the opposite side of the commodious harbour there was a mountain commanding a very extensive view both seaward and landward, and here they erected a signal-house, and placed in it a corps of quick-sighted Highlanders to give notice of the approach of any hostile force. The first public act of the infant colony was a declaration of freedom of

trade and of religion to all nations. This great and ennobling idea, which as yet had not been acted upon by any of the English colonies in the New World, with the curious exception of that of Maryland, planted by the Catholic Lord Baltimore, seems to have originated with Paterson, who, whatever were his birth and education, possessed an enlightenment and liberality really extraordinary, and notions about commerce and conscience which had hitherto been confined to a few speculative and inoperative philosophers. Acta, or New St. Andrew's, was admirably situated on the northern coast of the Isthmus of Darien or Panama, about midway between Puerto Bello and Carthagena, being about fifty leagues distant from either town. The magnificent natural harbour was capable of receiving the greatest fleets, and was defended from storms by numerous islands and islets. On the other side of the isthmus, the little-frequented and unoccupied shores of the Pacific were indented with bays and harbours equally commodious: but the land communication from sea to sea lay over rough and lofty mountains, and through wild forests; the river Santa-Maria, which ran across a great part of the isthmus into the South Sea, was scarcely navigable by canoes, except at certain seasons of the year, and for short distances: there was almost every variety of natural difficulty to overcome; the whole line was fitted for ambuscades and hostile surprises, and if the Spaniards at any time chose to move from the town of Santa-Maria or Panama, there were passes and places where five hundred men might have arrested the march of five thousand." Supported by the power of England, the settlement might probably have succeeded, and ultimately have become important. But the English government, on the contrary, in reply to the remonstrances of Spain, declared that the expedition had been undertaken without their sanction, and forbade any assistance from or intercourse with our West India Islands. The Spaniards commenced a series of hostile attacks, and though the colonists made a gallant and protracted resistance, "bad food soon produced disease; the climate assisted in those ravages; the hardy mountaineers of Scotland perished by dozens a day; and, at last, when the sad residue, despairing of succour from their native country, took to their ships, there were scarcely a hundred men with health and strength enough to work them."

The colony was at length abandoned, though not till another detachment, consisting of thirteen hundred persons, had been dispatched; who, after experiencing numerous misfortunes, arrived only in time to find the abandoned fortresses, in which they ultimately surrendered themselves as prisoners to the Spaniards. Independently of the hostility naturally to be expected from the Spanish settlers, Paterson's error was in supposing that a transit trade could be profitably carried on over rugged roads, in a most unhealthy climate, in a country almost uninhabited, and by adventurers with a limited capital. He had concluded that cargoes of goods landed at Acta, or New St. Andrew's, could easily be transported by land and river carriage from sea to sea, and then re-shipped in the Gulf of Panama for all the great countries of the East. But the streams were found in this part to be shallow and unnavigable; labour, except European, not to be procured; and no roads adapted for any burdens, except by mules. A village named Puerto Escoces, on the Atlantic side, seems the only existing monument of this melancholy undertaking.

The more modern idea has been that of constructing a navigable canal, either by cutting throughout the narrowest part, or, taking a longer course, by making the streams and lakes subservient to the purpose. To both these plans there are almost insuperable difficulties, as will be evident from a consideration of the nature of the country. Though the comparatively small width of the isthmus was soon discovered, and the means which it offered to a speedy and easy communication between the Atlantic and the Pacific were apparent, yet for three hundred years after this discovery the natural features of this region were entirely unknown. Robertson, in his 'History of America,' states that the isthmus is traversed in all its length by a range of high mountains; and it is only of late years that Mr. Lloyd, an Englishman, employed in 1827, by Bolivar, then President of Columbia, has surveyed the most eastern and narrowest part of it.

The place where the Andes of South America terminate has not been quite ascertained. On our maps a mountain is laid down, near 8° N. lat., which is called the Peak of Candelaria, but it is not known whether it is connected with the Andes or is an isolated summit. There are some reasons for supposing that it is not connected with that mountain-range. But it is certain that west of this mountain (77° 30′ W. long.) no range of hills or mountains, not even an isolated elevation of moderate height, occurs, and that the whole isthmus between the two seas is a flat country, only a few feet above high-water mark. This low country extends westward for more than a hundred miles to the western extremity of Mandingo Bay. The average width of this part of the isthmus does not exceed forty miles, and opposite Mandingo Bay, called also the Gulf of San Blas, it contracts to less than thirty miles. The shores on both oceans are rocky, and the whole region appears to consist of an immense mass of rock. The rocks, however, are covered by a thick layer of vegetable mould, and are covered with high forest-trees. The shores of the Caribbean Sea are difficult of access for large vessels, being lined with numerous small rocky islands called *keys*. Two rivers drain the isthmus. They are called respectively Chucunaque and Chepo, and rise near 78° 30′ W. long. The Chucunaque runs east-south-east about eighty miles, and, turning west by an abrupt bend, falls into the Bay of San Miguel; the Chepo or Ballano runs west-north-west, and empties itself into the Gulf of Panama, about twenty-four miles east of the town, making a similar turn to the south. Both rivers are navigable for large river-barges as far as the places where the great bend occurs. With all the advantages which this region possesses from its great fertility and the vicinity of two great oceans and navigable rivers, it is thinly inhabited, and chiefly by a tribe of Indians, the Mandingoes, or San Blas Indians, who are at constant enmity with the white settlers, though they receive in a friendly manner the vessels which annually visit the country from Jamaica. The whites have only a few settlements on the Chepo river, and even these are chiefly occupied by negroes. The small town of Chepo, above the bend of the river of that name, is the most considerable settlement of the whites, but the inhabitants have little communication with their neighbours the Mandingoes. The scantiness of the population of this region is mainly, if not entirely, to be attributed to the unhealthiness of the climate. Being open on all sides to a vast expanse of ocean, every wind brings rain, and thus hardly a day passes in which the country is not drenched by heavy showers, which sometimes last for several days together. The surface of the country, not having sufficient slope to carry off such an abundance of moisture, is converted into an immense swamp. This moisture of the air, indeed, maintains a most luxuriant vegetation, but the great quantity of vegetable matter, which is annually reproduced and decomposed, increases the miasma which exhales from a swampy soil under the influence of a vertical sun.

At the western extremity of Mandingo Bay some

hills commence, which gradually attain the elevation of mountains, and extend in a continuous chain as far west as a line drawn across the isthmus from Port Limones to the town of Panama, a distance of about sixty miles. These hills advance close to the shores of the Caribbean Sea, where they surround the town of Puerto Bello, but they remain a few miles distant from the Pacific, and are separated from it by a level prairie destitute of trees. These hills occupy nearly the whole width of the isthmus, but they are divided longitudinally into two ridges, between which lies the valley of the river Chagres. The southern ridge does not exceed one thousand or eleven hundred feet in height, but the northern rises much higher, especially east of Puerto Bello. These hills are generally covered with thick and almost impenetrable forests. The valley of the river Chagres is rather narrow, but the river itself is navigable to a considerable extent. The climate in this portion of the isthmus differs considerably in the north and in the south. At Puerto Bello, on the northern coast, the rains are almost continual, and generally descend in torrents, a circumstance which renders that place very unhealthy. At Panama, on the shores of the Pacific, the seasons are regular. In April the weather becomes cloudy about noon, but after drizzling for half an hour it clears up. In May, from nine to eleven o'clock, it is dull, with slight rains, but the afternoon is fine. In June there is rain every morning and evening, but the middle of the day is fair. As the season advances the rains gradually increase, and are incessant during July, August, September, and October. In November the nights are always rainy and cloudy, but during the days the sky begins to break. In December the weather improves, and in January, February, and March a shower of rain is as uncommon as a beam of sunshine in the other season of the year. The valley of the Chagres seems to partake rather of the climate of Panama than of that of Puerto Bello. At Panama the thermometer, in the rainy season, is 82° during the night, and 87° during the day; but the winds being at that season variable and cool, there is no stagnation in the atmosphere, though the rain is incessant. In the dry season the temperature rises to 90° and even 93° in the daytime, and the days are very sultry, inasmuch as calms prevail at that season; but the land-winds at night are cool, coming chiefly from the adjacent mountains; and the climate may be called generally healthy, though a considerable mortality sometimes occurs.

[To be continued.]

THE MECHANICAL ARTS IN PERSIA.

About two or three years ago, Mr. J. Robertson, a civil and mining engineer, who had been professionally engaged in the service of the Shah of Persia, communicated to the Royal Scottish Society of Arts an 'Account of the Mechanical Arts of Persia.' Of these communications an abstract was afterwards given in the 'Edinburgh Philosophical Journal;' and as the details are of a nature which are not commonly treated of in books of travels, we will here give a short notice, illustrated occasionally by references to the works of Fraser and Morier.

The art of carpentry, as understood in this country, can hardly be said to exist in Persia, the greatest effort in this department being confined to the construction of flat roofs of limited span. For forming these roofs a species of poplar is generally employed; but for other purposes oak, plane, and chestnut are used. Hard timber, of small scantling, is sold in bazaars, being brought thither from the forests on the backs of mules or camels. Morier states that in Persia "the people cut their trees about five feet from the ground, burning them a little, and then applying the hatchet;" and in another part he remarks that "their mode of felling the tree is susceptible of much improvement; for they first burn it towards the root (by which they injure the finest part of the wood) and then apply the axe."

As to the mode in which the Persian carpenter pursues his work, it is remarked that he follows the Eastern custom of sitting on the ground. Instead of a bench, a strong stake is driven down before him, leaving about ten inches above the ground; and upon this he rests his work, which he keeps steady with his feet. In the Royal Arsenal, however, English tools are used, and a better system of working has been introduced, under the superintendence of British officers; but in the native workshops the workmen are still to be seen squatting on the ground; and as all the tools are adapted for this mode of working, there seems but little reason to look for change, especially among a people who adopt new customs slowly.

Turning in wood is performed by a workman also seated on the ground: two stakes are driven down before him, a short distance apart; and an iron spindle, with a small drum attached, revolves between them. The spindle is passed through the wood which is to be turned, and, with the assistance of a bow-and-string, passed round the drum, is made to revolve rapidly. The bow is worked backwards and forwards, while the right hand holds the cutting-tool supported on a block of wood. By combinations of these two modes of working carpentry and turning, a large variety of domestic utensils are made in wood. Thus Mr. Fraser, in his journey to the northern provinces, came to a village where almost everything was made of wood: "The gates, portals and all, were constructed of wood, and a wooden bridge was thrown across the ditch; the very domestic implements, instead of being formed of earthenware or metal, were here made of wood. We saw trays, platters, cups, and bowls of this material."

In smith's work the Persians work only on a small scale, and with light and simple tools. The iron generally used is of Russian manufacture, brought by mules from the ports of the Caspian Sea. In the northern parts of Persia malleable iron is manufactured directly from the ore; and this description of iron has been long esteemed for making excellent horseshoes and horseshoe nails. As coal is almost unknown in Persia, the fuel used by the smiths is entirely charcoal prepared from hard wood. The smith stands when the work requires to be heated; but in finishing or making small articles he sits on the ground. The hearth is a small platform without a chimney, having a low wall on one side to prevent the bellows being injured by the heat. Anvil, bellows, hammer, tongs, and drill, form the smith's apparatus.

Working in stone is not much practised in Persia, owing to the buildings being formed chiefly of clay or brick. Grave-stones, mill-stones, and a few other articles, constitute the chief field for this operation. When the work admits of it, the stone-cutter sits upon the ground. The principal tools are, small double-pointed picks and mason-irons resembling large nails, some pointed and some chisel-shaped. With these tools the stone-cutters work very slowly, and it is only after immense labour that they succeed in bringing a hard stone to the required form. For boring in stone the instrument is an iron rod steeled at the end, but instead of a chisel-point, the end is cut off flat. Two parallel regular grooves are cut deep across this face, and these are intersected by three others at right angles, thus dividing the end of the rod into twelve compartments. While boring, the hole is kept full of water; and while the rod is turned round gradually with the left hand, the blows are struck by a small hammer held in the right.

In connection with stone-cutting may be mentioned the finer kind of work which comes within the sphere of the lapidary. The turquoise stones, found at Nishapore, are brought into shape, chiefly at the town of Mushed, by being ground on the edges of wheels, the wheel being rotated by a bow-and-string, and the rim having the requisite degree of roughness given to it by a layer of sand and gum-lac. Mr. Fraser, after describing this process, says:—"Besides the turquoise-cutters, there are a good many people in Mushed who gain a livelihood by cutting a dark grey stone, of a soft texture, into utensils for domestic purposes, as cups, dishes and platters, tea and coffee pots, water-ewers, and the like; all of which are much esteemed, and find their way to distant quarters of the country, though it is not easy to discover in what their peculiar excellence consists."

As the Persian houses are mostly built of brick, the art of brick-making is rendered one of some importance. A level space of ground having been selected near a stream of water, the grass and vegetable soils are carefully removed. The ground is then broken at one extremity of the prepared platform, and the easily pulverized clay is carefully passed through a small-meshed riddle, and placed in the hollow, while the stones and roots are thrown behind. When a sufficient quantity of riddled clay has been collected, a small stream of water is allowed to flow into the hollow, and the mass is brought to a proper consistency by treading. The prepared clay is now deposited in different small heaps upon the floor, which has been previously spread with finely-riddled earth. The moulds are formed of thin wood, without any of those projections or handles which are seen in this country. For the common-sized brick the mould is formed about nine inches square and one inch and a half deep; but larger bricks are sometimes required for paving courts and coping walls, for which another mould is necessary. The mould is placed on the ground, and the brick-maker, taking a part of the clay in his hands, places it loosely in the mould. He then dips his hands in water and throws a little of it around the inside of the mould to prevent the clay from adhering to the wood. By a peculiar action of the hands the clay is then drawn from the middle and pressed firmly into the corners and round the sides of the mould; and the whole is afterwards levelled over by a dexterous diagonal stroke of the right hand. The mould is now lifted off the brick and placed to the right hand side, close to, and in the same line with, the brick already formed; and it is again filled up in the same way. Thus he proceeds, frequently washing the mould in water, till a straight line of bricks has been laid down, of many yards in length; a second line is then commenced, exactly the thickness of the mould, from the first; and the whole ground is finally covered with closely-arranged rows of bricks. In two or three days, when the level space has been covered, the first-made bricks become sufficiently dried to be handled; and the brickmaker now proceeds to place them upon edge in lines; in a day or two they are sufficiently hard to be removed, and are then carried to a convenient spot, where they are built up edgewise in form of a wall, one brick in thickness, with small openings between them for the circulation of air. When twenty or thirty thousand have been thus collected, they are removed to a kiln to be burned; or if sun-dried bricks be required, they are at once ready for use.

As there is hardly any coal in Persia, the kilns are heated in a singular manner. The kiln is a small vault, dug out of the ground, and surrounded by a wall of sun-dried bricks, having a doorway at each end for receiving the fuel. Over the vault are several narrow arches, in which the bricks are laid edgewise; and after a fuel of stable refuse, withered plants, and brush-wood has been laid in the vault and kindled, the doorways are closed. In two or three hours dense white smoke rises and escapes at two openings left in the arching, and new fuel is from time to time introduced; but when enough has been thus thrown in, all the openings are closed, and the kiln left for two or three days, till cold, at which time the bricks are found to be sufficiently burned. The bricks thus made have a fine red colour and considerable hardness. It is said that a Persian will prepare the clay and make two thousand of these bricks in a day.

The houses are built either of bricks or of clay; if the former, a mortar of clay, chopped straw, and lime is employed. While building, the workmen do not use a trowel, but lay the mortar with the hand. The 'bond,' or mode of arrangement, is simple, as the bricks are square, and do not admit of a very varied arrangement. The mortar-joints are usually from one to two inches thick, and very irregular, unless in arches or doorways, when a good deal of neatness is often exhibited. As timber is scarce, brick arches and domes are common. The mode of making a semi-cylindrical arched roof, without centering, is very singular. After the side walls and gables have been erected, the curve of the arch is marked out upon one of the gables, and this is plastered over with the common clay mortar; a layer of brick is then stuck upon the mortar, and as the bricks are thin and light, they remain firm till the ring is completed, when small chips are pinned into the joints at the opening ends. When one layer is finished, it is plastered over with mortar, and a second layer is stuck upon it in the same manner, and so on until the whole length of arch is finished. A similarly primitive mode is adopted in the building of domes.

Many of the walls of houses are built hollow, that is, the bricks being so large in surface compared with the thickness, they are so placed, some horizontal and some vertical, as to give smooth outer and inner surfaces to a wall, and yet be full of hollow spaces, whereby material is saved under circumstances where strength is not required. In building the flat roof for dwellings, beams of poplar are laid across, which support small laths. A coarse mat, made of reeds, is placed on the laths; over this a layer of furze; and over the furze a thick layer of clay. The top of the clay is made to slope gently, and is rendered impervious to water by being coated repeatedly with clay and chopped straw.

For houses built of clay the material is generally procured near the intended erection, and is brought to the proper consistency by mixing with water and treading with the foot. For walls a foundation is cut out as far down as the vegetable mould, and this trench is filled up with small stones and clay. The walls are built in courses of about one yard in thickness, each course being allowed sufficient time to consolidate before another is laid. The workman stands upon the top of the wall, and being supplied with pieces of clay by an assistant below, he elevates his arms and throws the mass forcibly down, treading the pieces firmly together with his feet. The layers are brought to the required 'batter,' and smoothed on the outside, by means of a flat cutting spade. The heat and extreme dryness of the climate soon render a wall of this description hard and firm: they last a very long time, as rain seldom falls. Most Persian villages are surrounded by high walls of this kind, having flanking towers at every angle and a rude ditch in front, from which the materials were excavated; and even the fortifications of the principal cities are constructed of the same material.